

Amendments to the Specification:

Please amend the first full paragraph on page 1 (lines 4-5) as follows:

-- This application is the National Stage of International Application No.

PCT/US99/18055 filed August 9, 1999, which claims the benefit ~~is a continuation-in-part~~ of U.S. Provisional Application No. 60/096,175, filed August 11, 1998, which is incorporated herein by reference.--

Please amend the first full paragraph on page 3 (lines 4-11) as follows:

--This invention is directed to a method of beneficiating a mineral sulfide-containing material or a metallic species of gold, silver, copper, palladium, platinum, iridium, osmium, rhodium, ~~and or~~ ruthenium by froth flotation in the presence of a collector as well as a collector for beneficiation of sulfide minerals, precipitates, or metallic species ~~by froth flotation~~. In both aspects, the collector includes at least one oil which is either an essential oil or a natural or synthesized oil comprising triglycerides containing fatty acids of only 20 carbons or less, or an ester made from a fatty acid and an alcohol.--

Please amend the third full paragraph on page 3 (lines 19-25) as follows:

--In the collector aspect of the invention, a collector is provided for beneficiation of sulfide minerals or precipitates from ores, concentrates, residues, tailings, slags, or wastes ~~is provided~~. The collector includes at least one sulfur-containing sulfide mineral flotation ~~promotor~~ promoter; and at least one oil selected from the group consisting of (1) a natural or synthesized oil comprising at least one triglyceride, or at least one ester made from a fatty acid and an alcohol; ~~or and~~ (2) an essential oil.--

Please amend the fourth full paragraph on page 3 (lines 26-29) as follows:

--This invention has ~~the~~ an advantage that the specified triglyceride, specialty, or essential oil will selectively float sulfide minerals by itself or mixed with other collectors. This and other advantages will be apparent from the ~~detail~~ detailed description of the invention that follows.--

Please amend the first full paragraph on page 4 (lines 2-11) as follows:

--The subject invention provides materials and methods useful in the recovery of minerals. These materials and methods are specifically applicable to froth flotation procedures; whereby, minerals are removed and recovered from complex mixtures of ores, residues, concentrates, slags, and wastes. The subject invention can be used in remediation processes to remove unwanted materials or may be used in mining processes to recover valuable minerals. Specifically exemplified herein is the use of certain triglycerides, esters of fatty acids and long chain alcohols, and essential oils of both terpene and aromatic chemistries. Any of these oils may be used alone, in mixtures ~~of these oils~~, or in combination with other collectors.--

Please amend the third full paragraph on page 4 (lines 19-25) as follows:

--In the collector aspect of the invention, a collector is provided for beneficiation of sulfide minerals or precipitates from ores, concentrates, residues, tailings, slags, or wastes ~~is provided~~. The collector includes at least one sulfur-containing sulfide mineral flotation promoter promoter; and at least one oil selected from the group consisting of (1) a natural or synthesized oil comprising at least one triglyceride, or at least one ester made from a fatty acid and an alcohol; ~~or~~ and (2) an essential oil.--

Please amend the first full paragraph on page 5 (lines 3-7) as follows:

--Alternatively, the method may be ~~carried out in the same steps except used for~~ acting upon metallic species such as gold, silver, copper, palladium, platinum, iridium, osmium, rhodium, and ruthenium by froth flotation in the presence of a collector. The metallic species may be from material derived from any ore, concentrate, residue, tailings, slag, or waste.--

Please amend the paragraph bridging pages 6 and 7 (page 6, line 25 to page 7, line 2) as follows:

--It was found, however, that there are unexpected benefits of using certain organic compounds containing no sulfur, no nitrogen and no phosphorous for selective froth flotation of certain sulfides. These molecules contain oxygen in a variety of

functional groups such as triglycerides and esters. These groupings occur in many natural oils, such as cottonseed, corn, palm, safflower, jojoba, and clove. Surprisingly, many of these oils are non-toxic and are used in foodstuffs throughout the world. The oils run in price from \$0.40 per/kilogram per kilogram to over \$125 per/kilogram per kilogram--

Please amend the first full paragraph on page 7 (lines 3-10) as follows:

--It was also unexpected that blends of these oils with each other and with standard collectors frequently exhibit synergistic or enhanced effects, in that a mixture of a sulfur containing collector with a non-sulfur containing collector may perform better than either of the components alone, and mixtures of multiple components may perform better than a two-component blend. This invention is uniquely suited to such mineral species as chalcocite, chalcopyrite, bornite, galena, and sphalerite. However, sulfur species such as pyrite are not as readily floated by these non-sulfur-containing collectors.--

Please amend the paragraph bridging pages 7 and 8 (page 7, line 21 to page 8, line 8) as follows:

--Saturated or highly saturated oils, such as coconut oil, contain triglycerides made from a zero or a low percentage of fatty acids with having double bonds. Linseed oil contains a high percentage of linolenic acid oil, an 18 carbon fatty acid with three double bonds (expressed as C_{18:3}). The composition of some common natural oils is shown in Table 1. The iodine value is a measure of the unsaturation of the oil. The saturated fat column is for the percentage of saturated fat when the exact chain length is unspecified. A given type of oil composition will vary with the variety of plant, the growing conditions and the treatment of the oil after pressing. For instance, there are both high and low erucic acid (C_{22:1}) species of canola oil. Some canola oil is also hydrogenated (hydrogen reacted with the double bonds) before being sold.--

Please amend the second full paragraph on page 10 (lines 5-12) as follows:

--There are some unique natural oils. Sperm whale oil is contains esters made from long chain fatty acids and long chain fatty alcohols instead of esters of the fatty acid and glycerol as in triglycerides. Both the fatty acid and long chain alcohol usually contains contain at least 1 double bond. Sperm whale oil is, of course, no longer available due to whaling restrictions. However, its replacements, jojoba oil (vegetable) and orange roughy oil (fish), have the same basic chemistry as sperm whale oil. The only differences between them are in the carbon numbers (chain length) of the various components of the oils.--

Please amend the second full paragraph on page 11 (lines 13-20) as follows:

--~~Terpene chemistry is~~ Terpenes are defined as compounds that can be assembled from two or more ~~moles~~ molecules of isoprene (C_5H_8) and the alcohol, aldehyde, and ketone derivatives of such compounds. A terpene compound can be defined as a monoterpane, sesquiterpene, or diterpene compound based on whether it contains 2, 3, or 4 isoprene units, respectively. Within each of these classifications the compounds can be further defined as being acyclic, monocyclic, bicyclic or tricyclic depending on whether the terpene contains, respectively, 0, 1, 2, or 3 ring structures (only diterpenes are tricyclic). Tricyclic diterpenes are generally solids.--

Please amend the third full paragraph on page 11 (lines 21-24) as follows:

--Aromatic chemistry for essential oils is refers to the chemistry of derivatives of benzene. The two most common aromatic components of essential oils are cinnamaldehyde and eugenol. These are obtained from cinnamon and clove oil. Their structures are shown in Figure 2.--

Please amend the second full paragraph on page 12 (lines 10-15) as follows:

--Preferably, the essential oils used in the ~~method~~ methods of this invention include either a terpene compound or an aromatic compound. More preferably, the essential oil includes a terpene derivative having a functional group selected from an alcohol, an ether, an aldehyde, or and a ketone. Specific preferred essential oils

include limonene, citronella, eugenol, eucalyptus globus, camphor, and clove oil. A more preferred group of essential oils includes limonene and citronella.--

Please amend the paragraph bridging pages 12 and 13 (page 12, line 16 to page 13, line 7) as follows:

--As work with the triglycerides, esters and alcohols ~~have has~~ indicated, other oxygen-containing compounds such as aldehydes, ketones, and ethers of sufficient carbon number to be water-insoluble function as collectors for sulfide minerals. These compounds may or may not have carbon-carbon double bond(s).--

Please amend the first full paragraph on page 15 (lines 2-13) as follows:

--This example is illustrates the effectiveness of cottonseed oil as a collector for molybdenite and chalcopyrite. The ore had a head grade of 0.259% Cu and 0.0064% Mo. The ore charge of 1.0 kilogram was ground at 60% solids to 60% passing (P60) a 150 micron (100 mesh) screen. The ground ore slurry was adjusted to a pH of 10.5 with lime. The ore was ground with 10 gram/ton (0.020 pound/ton) of secondary collector. A Denver laboratory flotation machine was used. The ore slurry charge was diluted with water to 29 percent solids, and 6 grams per ton of the main collector, sodium ethyl xanthate, and 25 gram/ton (0.05 pound/ton) of the OrePrep F-533 frother were added. The flotation was carried out for a total of six minutes with a two minute break for conditioning at the halfway point. During the conditioning break, 4 gram/ton dosage of the sodium ethyl xanthate was added.--